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33727 7590 11/19/2008 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER MONDT, JOHANNES P	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



### DETAILED ACTION

1. Request for Reconsideration filed 07/30/2008 and the Approval of the Terminal Disclaimer filed 3/27/08 on 5/12/08 form the basis for this Office Action. Comments on "Remarks" in said Request for Reconsideration are included below under "Response to Arguments".

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. ***Claims 24 and 26-29*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Orii et al (US 6,735,267) in view of Ueda et al (US 5,068,082) and Johansson et al (US 5,229,068). The rejection first made of record in the Office Action mailed 12/20/06 and included by reference in its entirety in the previous Office Action is herewith once again included by reference in its entirety, without any change.

4. ***Claims 31-33*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Orii et al (US 6,735,267) in view of Johansson et al (US 5,229,068). The rejection first made of record in the Office Action mailed 12/20/06 and included by reference in its entirety in the previous Office Action is herewith once again included by reference in its entirety, without any change.

***Response to Arguments***

5. Applicant's arguments filed 07/30/08 in Remarks have been fully considered but they are not persuasive.

Although the Terminal Disclaimer has been approved and consequently the provisional double patenting rejection has been withdrawn applicant's arguments in traverse of the art rejections are not persuasive for the following reasons:

(A) Rejections of claims 24 and 26-29 over Orie et al (US 6,735,267) in view of Ueda et al (US 5,068,082) and Johansson et al (5,229,068).

(a) In Applicants' first argument, Applicant appears to base his traverse on what seems to be a need to find some teaching or suggestion within Orie et al on part-length rod orientation, the use of part-length rods to improve reactor shutdown margin and that instead Orie's objective is attaining core stability by increasing burn-up without pressure loss. See page 9.

Examiner disagrees on the need for a suggestion from Orie et al so characterized because nothing in the MPEP requires any such teaching or suggestion from the primary reference to exist. See MPEP 2143, section III.

(b) Applicant stresses that the focus of Orie et al is to find part-length rod orientations that meet the conditional requirements of "Equations 1-6" such that the fuel assembly burn-up is increasing without increasing a pressure drop. See the underscored text on page 9. This second argument fails to persuade because (a) only the *total* number ("n") of part-length, "second" (col. 4, l. 4-5) fuel rods 2b ("short-length

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fuel rods; col. 6, l. 7) (col. 2, l. 25-26) features in said Equations rather than their specific orientations, while said "Equations", moreover, are not "Equations" in the strict sense of the word, but instead are Inequalities defining constraints between parameter ranges, for the ratio of leaving ample degrees of freedom for their satisfaction, as shown by the multitude of working examples in Orii et al; while (b) said so-called "Equations" do not exclusively describe the invention by Orii et al, because, as subsequently admitted by Applicant, alternative embodiments of 10x10 arrangements with part-length fuel rods adjacent the water passages also allow for values of "n" other than within the constraints expressed by Equations 1-6, as shown by the alternative embodiment (col. 5, l. 36+) of Figure 15 cited in the Office Action, in which 12 fuel rods of partial length 2B are included only. In this regard, it is noted that the Figure 15 pattern of part-length fuel rods does NOT satisfy the specific conditions expressed in Equations 1-6, but instead depicts a fourth embodiment in accordance with the invention, governed by Inequalities 1, 3, 4, 6, 11 and 15 (see col. 3) but with only 12 part-length fuel rods, and characterized in that the part-length fuel rods 2B are arranged in the outermost tier of the fuel rod array and in the middle portion (adjacent two neighboring cylindrical water passages 3) (Figure 15). As pointed out explicitly by Orii et al: The fourth invention "can also attain the same effects as the first invention" (col. 3, l. 43-4). Note that a change from 12 to 14 part-length fuel rods from the 12 in Figure 15 is a change towards the center of the claimed range for "n", so that evidently the constraints on the remaining parameters do not appear to become more severe through a change of 12 to 14 part-length fuel rods.

(c) Applicant further alleges that “these Equations” (i.e., inequalities 1, 3, 4, 6, 11 and 15) “do not optimize conventional fuel rods, which may be located near a water passage”. This allegation is entirely irrelevant for the rejection, which is not based on optimization of conventional fuel rods. Instead, these “Equations”, - or rather: Inequalities, delineate for a 10X10 array of fuel rods ranges for the number of part-length fuel rods (n), the ratio of full-length rod length divided by part-length fuel rod length, average burn-up, and the ratio of the total cross-sectional area of water rods divided by the total cross-sectional area of bottom portion coolant flow (col. 3, l. 37-43), thereby succeeding in increasing burn-up with attaining allowable core stability, but without increasing pressure loss (“Summary of the Invention”), which defines the optimization achieved within the ranges defined by the constraints 1, 3, 4, 6, 11 and 15.

(d) Applicant goes on (pages 11-12) to require in essence that Ueda et al, the secondary reference, must teach a host of other limitations already taught by the primary reference. These arguments fail to persuade because in doing so applicant greatly exaggerates what has to be learned from Ueda et al, evidently insisting Ueda et al to almost anticipate the claimed invention. Instead, the question is whether a teaching by Ueda et al of a pair of three “interposed” fuel rods adjacent and on opposite sides of the water passage in the central region of the fuel assembly as replacement of a pair of two such part-length fuel rods adjacent and on opposite sides of such water passage in Orij et al would have been obvious, and whether it would have been obvious to include the teaching by Johansson et al in the invention by Ueda on the selection of part-length fuel rods so as to mitigate pressure drops. Even arguendo, as to applicant’s arguments:

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both water passages have their center of gravity in the center. Furthermore, for an array of 8X8 fuel rods an increase by one from 2 to 3 part-length fuel rods adjacent the water passage on each side is a relatively larger change than for a 10X10 array of fuel rods. Applicant is reminded that non-obviousness cannot be established by attacking the references individually when the rejection is predicated upon a combination of prior art disclosures. See MPEP 2145, section IV and Case Law referred to therein.

(e) Applicant also alleges that the combination of references still does not teach the limitation on the first part-length rod group defined by lines 9-13 of claim 24 (see page 12 of Remarks). Examiner disagrees, because, starting with Figure 15 in Orii et al and increasing the number of part-length fuel rods 2B adjacent the water passages 3 so as to form triplet exactly according to Figure 19 in Ueda et al, i.e., with a central part-length fuel rod centrally positioned and pointing to the geometric center of the fuel rod array meets the limitation.

(f) Applicant continues to allege improper combination (pages 12-13), in particular alleging that the combination destroys the intended function of Orii, relying again on what applicant calls "Equations", but which are in reality only Inequalities that very broadly constrain the parameter set consisting of the number of part-length fuel rods (n), the ratio of full-length rod length divided by part-length fuel rod length, the average burn-up, and the ratio of the total cross-sectional area of water rods divided by the total cross-sectional area of bottom portion coolant flow (col. 3, l. 37-43). Because implementation of the teaching by Ueda et al and Johansson et al in the invention according to the fourth embodiment of Orii et al (col. 12, l. 55 – col. 14, l. 16) evidently

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satisfies all so-called "Equations" or Inequalities, there is no question that the inventions may be combined and that there is no possibility that the specific teachings by Orii et al are destroyed: In particular, the stable, hatched zone (see col. 9, l. 3) in Figure 16 (pertaining to the fourth invention by Orii et al (see col. 5, l. 16-25 for the meaning of the "hatched zone") permits  $Awr/Ach=0.125$ , and  $Lp/Lf=0.5$  (allowed by "Equation" 4), yielding 0.1074 for the numerical threshold for  $Awr/Ach$  on the right-hand-side defined by "Equation" 15, thus allowing to meet the Inequalities defined by "Equations" 3 and 15 simultaneously, while the right-hand-side of "Equation" 6 equals 0.223(N.B.:  $\pm 0.001$  for all values here). Clearly, the stable value of  $Awr/Ach = 0.125$  satisfies  $0.223 \geq 0.149 \geq Awr/Ach \geq 0.1074$  and hence is part of the domain that guides the specific embodiments disclosed by Orii et al.

(g) Applicant also alleges impermissible hindsight (pages 13-14), alleging in particular a time honored but obsolete insistence on teaching/suggestion/motivation. In response, examiner draws attention in this regard to the above calculations showing that the claimed invention is within the range that guides the specific embodiments disclosed by Orii et al, and also draws attention to the finding as made of record by the examiner of a teaching of the benefits of part-length fuel rods (Johansson et al), and of the actual occurrence in analogous art by Ueda et al (there can be no doubt that Ueda et al is analogous art: fuel assembly with water passage in and around the center of the fuel rod array and including less than fully complete fuel rods ("interposed" fuel rods)) of an actual teaching of the first part-length fuel rod group as claimed. Furthermore, attention is also drawn to the finding by a recent Supreme Court Decision post-dating



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the dated case law provided by applicant that “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the interferences and creative steps that a person of ordinary skill in the art would employ” (KSR, 127 S.Ct. at 1741).

(h) Applicant’s traverse of the statement by examiner that the inclusion of the third part-length fuel rod is “no more than duplication of parts with predictable and intended effects” (pages 14-15) is predicated on the same misinterpretation of the above “Equations” as a system of true equations usually solvable at best for discrete parameter value(s), while these “Equations” are Inequalities that only broadly define the permissible regime from which the embodiments by Orie et al are taken. Examiner points to the above calculation to show that the combined invention is allowed by these “Equations”. Applicant is also reminded of the teaching by Johansson et al on the desirability of part-length rods. Therefore, this replacement of two full-length rods by part-length rods is at best no more than the combination of familiar elements according to known methods, which is likely to be obvious where, as here, it does no more than yield predictable results (see Figure 16 in Orie et al).

In conclusion, in view of the above response (ad (a)-(h)), Applicant’s arguments in traverse of the rejection of independent claim 24 are not persuasive.

Applicant has not provided independent arguments to show error in the rejection of claim 28.

(B) Rejections of claims 31-3 over Orie et al (US 6,735,267) in view of Johansson et al (5,229,068).

( $\alpha$ ) Applicant bases his first argument of traverse by reciting what Orie et al do not teach or suggest (pages 17-18), thus attacking the individual primary reference (Orie et al) for lack of teaching and failure to suggest. Said traverse fails to persuade because the rejection is based on the teaching by Johansson et al to supplement the primary reference, providing motivation to replace some of the full-length fuel rods by part-length rods (either two (claim 31) or three (claim 32)).

( $\beta$ ) Applicant traverses also because Equations 1, 4, 8, 10, 16 and 17 for the fifth embodiment (col. 14, l. 17 – col. 15, l. 34) allegedly prevent application of the teaching by Johansson et al (page 18). In response to Applicant's argument examiner notes that for an additional two part-length fuel rods these "Equations", as those governing the possibilities of selecting the embodiment of Fig. 15, are really only weak constraints through Inequalities. A replacement of two full-length fuel rods by two part-time fuel rods, i.e., "n" = 14, for the stable regime (hatched) as indicated in Figure 22, allows for the selection of the same ratios of the lengths of the full-length fuel rods over part-length fuel rods of 0.5, allowed by "Equation" 4, which yields the following constraint through "Equations" 8 and 17 for said ratio:  $0.097 \leq A_{wr}/A_{ch} \leq 0.169$ , which is compatible with "Equation 10", because the latter yields  $A_{wr}/A_{ch} \leq 0.195$ . Thus, for instance, a ratio of 0.125, seen to be well located in the hatched region, corresponds to an acceptable specific embodiment, as was also the case in the teaching by Orie et al of the embodiment of Figure 15 discussed above. In the case of a replacement of three full-length rods by part-length rods "Equation" 10 requires said ratio not to exceed 0.207 while "Equations" 8 and 17 determine the window for said ratio as follows: 0.092

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$\leq A_{wr}/A_{ch} \leq 0.169$ . The replacement of an additional rod thus seems to even slightly widen the acceptable range. Therefore, nothing prevents the application of the teaching by Johansson to Orii et al so as to arrive at the inventions defined by claims 31 and 32. In addition, as mentioned before, Johansson et al teach why such replacement is a good idea. Therefore, applicant's argument is not persuasive.

For all of the above reasons none of applicant's arguments in traverse persuade and hence the rejections stand.

### ***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHANNES P. MONDT whose telephone number is (571)272-1919. The examiner can normally be reached on 7:30 - 17:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Johannes P Mondt/  
Primary Examiner, Art Unit 3663